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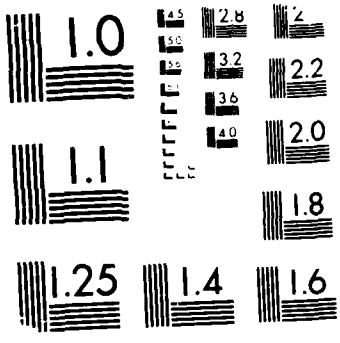

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ASSET SEARCH PATTERN FOR DRMS MILSTRIP REQUISITIONING

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The objective of this project was to determine the transportation cost savings that could be achieved by changing the search algorithm presently used in the Defense Reutilization and Marketing Service (DRMS) mechanized MILSTRIP requisitioning system. The current system chooses the best assets to fill a requisition, whereas the proposed system selects the closest acceptable assets. Transportation costs were calculated for each routine by using actual requisitions. The quality of the assets being shipped would decrease only slightly with the proposed routine. The study recommends that this new routine be implemented if the expected cost savings is great enough to offset the cost of recoding the computer program.

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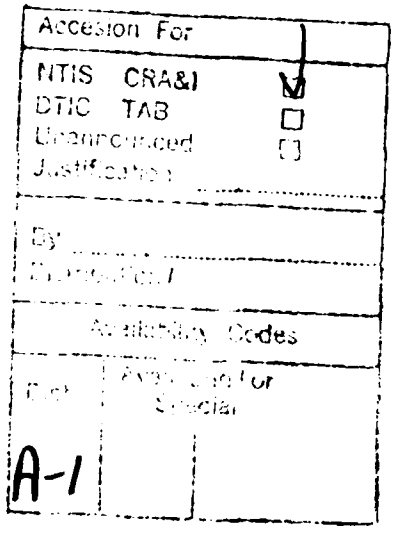

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FOREWORD

This report presents the results of an analysis of the Defense Reutilization and Marketing Service mechanized MILSTRIP requisitioning system. A proposed change to the asset search routine of this system that would reduce transportation costs was evaluated. The current system selects the asset or assets in the best condition to fill a requisition, whereas the proposed system would ship the closest acceptable assets to the customer.

Transportation costs were calculated for each routine by using actual requisitions from the first four months of the system's use and a snapshot of the asset database. The majority of requisitions that had acceptable assets on-hand would have been filled from the same DRMO regardless of the search routine used. A transportation cost savings of approximately two percent would have been achieved for these requisitions by using the proposed search algorithm. The quality of the assets being shipped would decrease only slightly with the proposed routine.

The proposed search routine should be used if the number of requisitions requiring the search algorithm is expected to increase once the requisitioning system is fully implemented. If the number of requisitions does not get larger, then the cost of the programming effort to implement the proposed system may be more than the transportation savings that could be achieved.

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I. INTRODUCTION

A. Background

The Defense Reutilization and Marketing Service (DRMS) manages all reutilization and disposal operations for DOD excess personal property. These operations are conducted by the 139 Defense Reutilization and Marketing Offices (DRMOs) situated throughout the world. Most requisitions received by DRMS are for a specific asset. In these cases, the requisitioner visits a DRMO and identifies an item that can be used. A requisition is then generated for the particular asset that was selected. Recently, DRMS implemented a mechanized MILSTRIP requisitioning system to issue material from the DRMOs. This system allows the requisitioner to request an item from DRMS without knowing if any assets are available at the time.

The mechanized MILSTRIP requisitioning system is currently designed to provide the best available assets to the requisitioner. Every asset at a DRMO is assigned a Federal Condition Code (FCC) which is an indication of its quality. Only those assets with an FCC that is better than or the same as the FCC on a requisition will be considered acceptable for shipment. When a requisition is received by DRMS, the asset records in the database are examined and the asset with the best FCC is selected for shipment to the requisitioner. If more than one asset has the best FCC, then the asset at the DRMO closest to the "ship to" address on the requisition is picked. This procedure is repeated, if the requisition is for more than one item, until the entire requisitioned quantity is filled or no acceptable assets remain. The routine ensures the requisitioner receives the best available assets at the time of the request.

A proposal to change the search routine is now under review. This routine is designed to minimize transportation costs by shipping assets from the closest DRMOs. When a requisition is received, the closest DRMO will be examined to determine if any requested assets are available there. If more than one asset is available, the asset with the best FCC that meets or exceeds the requisitioner's minimum FCC is selected for shipment. If additional assets are needed to fill the requisitioned quantity, any remaining acceptable assets from this closest DRMO will be selected before assets from any other location. If the closest DRMO has no acceptable assets or a shortage of assets, the next closest DRMO is designated to fill the remaining quantity if possible. This procedure is repeated until the requisition is filled or no assets remain. This procedure guarantees the lowest transportation cost because the shipments will always come from the closest DRMO with assets.

B. Purpose. The purpose of this analysis was to determine the difference in transportation costs between the two search routines. By comparing the shipping costs for each of the search methods, DRMS could decide if reprogramming the MILSTRIP requisitioning system to include the proposed routine is desirable.

C. Objective. The objective of this study was to determine the transportation cost savings produced by the proposed DRMS asset search pattern for processing requisitions. In addition to the costs, the assets selected for shipment by each method should be compared to evaluate the degradation in quality that may occur from the proposed system.

D. Scope. This study was designed to provide actual cost differences between the two search routines using actual requisitions and a snapshot of the asset position. Prediction of future cost savings will be difficult due to the following assumptions and limitations that apply to this analysis.

1. The requisitions used in this analysis are actual requisitions submitted by the Services during the period from October 1986 to February 1987. This 4 - 5 month period was the initial start up time for this system. The military services and other agencies had not fully implemented this new requisitioning procedure into their system, and several still have not done so. During this initial phase-in period, the number of search routine requisitions was expected to be relatively small. This proved to be the case; therefore, this study was conducted using this small and possibly not representative group of requisitions.

2. The assets considered available for shipments were those in stock at the DRMOs on a single day in February 1987. The asset position of DRMS changes constantly, and an asset that is not available on one day may be available on a later date. By matching requisitions arriving over a period of months with assets available on a single day, a distorted supply availability may result. In addition, since actual requisitions were used, it is possible that assets were available when the requisitions arrived and then shipped to the customer. These assets would not appear on the asset file and this would tend to underestimate the number of requisitions that could be filled using the search routines.

II. CONCLUSIONS

The objective of this analysis was to determine the transportation cost savings that could be achieved by changing the search algorithm presently used in the DRMS mechanized MILSTRIP requisitioning system. The present system chooses the best assets, whereas the proposed system selects the closest acceptable assets. We matched actual requisitions that had been run through the search routine with the asset data base as it existed at a particular point in time. Out of 707 original requisitions, our final data base consisted of 42 requisitions and 268 assets.

The requisitions were run through each of the search routines and transportation costs were calculated for each of the shipments. Of the 42 requisitions, 32 would have been filled by the same DRMO regardless of the search algorithm used. Five of the requisitions could not be filled from any DRMO because no assets existed at the time of the request, and five requisitions would have been filled by different DRMOs with the two routines. The cost savings from implementing the new search routine for

these 42 requisitions would have been $45. This is a two percent savings for all shipments made. The quality degradation associated with the new search routine would be minimal since the majority of the shipments were identical under both systems.

III. RECOMMENDATIONS

The proposed search routine should be implemented if DRMS expects the number of requisitions requiring the routine to increase sufficiently to offset the reprogramming costs. The proposed routine will always result in transportation costs which are no greater than the current system and has the potential to generate significant savings. The small sample of requisitions used in this analysis does not allow for a prediction of future savings, but a cost reduction using the proposed routine would be realized. However, DRMS should ensure that the expected savings are great enough to offset the cost of recoding the computer program before implementing the new routine.

If the proposed system is not implemented for any reason, an analysis similar to this one should be performed within two years. During this time period the system will become fully operational. The actual number of requisitions received by DRMS will be available, and an accurate estimate of the potential transportation cost savings can be made. In order to better estimate the savings, monthly snapshots of the asset database should be maintained during this two year period. This will allow the requisitions to be matched with assets available at the time of the request.

IV. METHODOLOGY

A. Assumptions. Several assumptions were made in order to perform this analysis. These assumptions were necessary since the mechanized MILSTRIP requisitioning system had recently been implemented and a comprehensive data base was not available. These assumptions and their effect on this analysis are given below.

1. The asset data base used was representative of the asset situation at any given point in time. If the assets in stock vary from day to day then the number of shipments made may not be an accurate portrayal of reality.

2. The items that were requisitioned and subsequently shipped in the model were an accurate sample of items in terms of weight and quantity requisitioned. If the sample of items used in the model were lighter or requested in smaller quantities than usual, then any possible cost savings may be underestimated.

3. The number of requisitions received during the initial 3 - 4 month start-up period is similar to the number that would be received once the program was fully implemented. This is probably the least valid assumption since DRMS expects the number of requisitions to increase as more facilities learn of the new system.

For these reasons, the cost savings derived in this analysis are not meant to predict actual savings if the proposed system were implemented, since the more requisitions received at DRMS, the greater the potential to realize additional savings. Rather, this analysis reveals the relative savings of the proposed system compared to the existing system for these particular requisitions. After full implementation has occurred and the actual number of requisitions and the type of items requested are known, a better estimate of cost savings can be calculated.

B. Data Base Construction and Data Screening. Two types of data were requested from DRMS. Requisitions that would be run through the search algorithm were needed, as well as the location and number of assets on hand at the DRMOs. The asset data base was examined and any asset not being requisitioned was eliminated. In addition, any asset that did not have an acceptable FCC was eliminated. After the assets were screened, the requisitions were compared to the available assets and any requisition having no assets on-hand was excluded. Therefore, the resulting database contained only those requisitions which had at least one acceptable asset at a DRMO.

C. Determination of Shipping DRMOs. The requisitions were sorted by date so they would be processed in this analysis in the same order by both search routines. The requisitions were then used with each search routine to determine the appropriate shipping locations. The following is a description of the search technique used by the existing and proposed methods.

1. Current Technique. To determine the shipping DRMO for a requisitioned item using the current search method, the available assets were ordered from the highest to the lowest quality. If two or more assets were of equal value then these assets were further sorted on their distance from the requisitioner. After this ordering process occurred, the highest quality asset was selected for shipment. If additional assets were needed to fill the requisition then the next highest asset was selected. Assets were continually selected off this ordered list until the entire requisition amount was filled, the asset list was depleted, or no assets meeting the minimum FCC requirement remained.

2. Proposed Technique. The procedure for filling requisitions under the proposed search routine also ordered the assets, but the ordering was based on distance first and quality second. The assets were sorted from the closest to the furthest and if two or more assets were located at the same DRMO then these items were sorted from the highest to lowest quality. When filling the requisition the first asset on the list was selected and its FCC was compared to the FCC on the requisition. If the asset had an acceptable condition code it was selected for shipment. If this asset was rejected or additional assets were needed, the next item on the list was selected and the comparison procedure was repeated. This process continued until the requisition was filled or the available assets were depleted.

E. Calculation of Transportation Costs. After all the assets were selected for shipping by both methods, the final step in the analysis was to calculate the transportation costs for each search routine technique. The shipping cost was determined by calculating the weight of the shipment and then using the appropriate parcel post, small package carrier, or freight table to find the charges. The individual transportation charges for each shipment were then summed and a total transportation cost for each search method was derived for the sample requisitions.

V. ANALYSIS

A. Constructing the Data Base

We received two data bases from DRMS, a requisition file and an asset file. The requisition file contained all the requisitions received at DRMS for the one year period ending in February 1987. This file contained 18632 records of which 707 would have used the search routine. The 707 was a rather small number of requisitions; however, this was for a new system running for only 4 - 5 months of the one year period.

The asset file contained almost 560,000 records. This file had a list of all the assets on-hand at the DRMOs in February 1987. By matching the asset file with the search routine requisition records, we found approximately 10,000 assets with the same National Stock Numbers (NSNs) as 322 of the 707 requisitions. The other requisitions had no assets available at the DRMOs. We further reduced the asset and requisition data bases by eliminating any record with an invalid FCC or an FCC for an asset that was not acceptable by the services. The final data base used in the analysis consisted of 42 requisitions and 268 asset records.

B. Cost Evaluation

Each of the 42 requisitions was run through both search algorithms to determine the asset or assets that would fill the requirement. The weight of these shipments was calculated and the transportation costs were determined. Of the 42 requisitions, 32 of them were filled by the same DRMOs using the current and proposed systems. The proposed system would have filled five requisitions from different DRMOs than the current system, and five requisitions would not have been filled because no assets remained in stock.

The total calculated transportation cost using the current search routine for the 37 filled requisitions was $2,460. The cost using the proposed method was $2,415 for a transportation savings of $45. This equates to a two percent savings using the proposed method for items that need a search algorithm.

C. Asset Quality. Since 32 of the 37 shipments would have come from the same DRMO with either method, the same assets would have been shipped and there would be no difference in asset condition. For the five requisitions that resulted in different shipping DRMOs for each search routine, the quality difference between assets was not great. The five asset condition codes for these requisitions are given in Table 1. Table 2 explains the meanings of the FCCs used in the previous table.

Table 1

FEDERAL CONDITION CODES FOR THE ASSETS WHEN

THE TWO ROUTINES SHIPPED FROM DIFFERENT DRMOS

Requisition	Current Search Routine Asset Condition Code	Proposed Search Routine Asset Condition Code
1	A1	A2
2	A1	A4
3	A1	B1
4	A5	F7
5	F7	F8

Table 2

DEFINITION OF THE FEDERAL CONDITION CODES*

FCC	Definition
A	Serviceable (Issuable without qualification)
B	Serviceable (Issuable with qualification)
F	Unserviceable (Reparable)

* The numbers in the FCC are qualitative grades within each code with 1 being the highest quality and 9 being the lowest quality.

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